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(54) [Title of the invention]

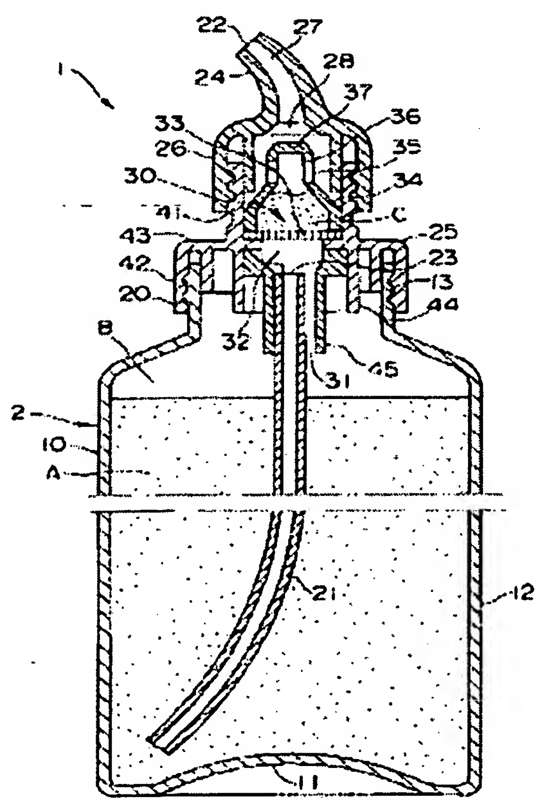
Bleaching detergent product

(57) [Abstract]

[Problem] To obtain a bleaching detergent product contained in a squeeze-foam container which can deliver

foam suitable for bleaching and cleaning when the body part of the container is squeezed by hand.

[Means of solving the problem] Liquid composition A containing from 0.5% by weight to 10% by weight of bleaching agent and from 1% by weight to 50% by weight of surfactant is loaded into squeeze-foam container 2, where this container 2 comprises mixing chamber 32 for mixing with air B the composition A that is supplied from the inside of container body 10 via liquid supply tube 21 when body part 12 is squeezed; mesh member 33 which produces foam C when the mixture obtained in mixing chamber 32 is passed through it and thereby foamed; and delivery outlet 22 for delivering foam C; and the mesh size of the mesh member is from 100 μm to 600 μm.



[Scope of the patent claims]

[Claim 1] A bleaching detergent product characterised in that a liquid composition containing at least from 0.5% by weight to 10% by weight of bleaching agent and from 1% by weight to 50% by weight of anionic and/or nonionic surfactant is loaded into a squeeze-foam container that can deliver the liquid composition from a delivery outlet as a foam,

where this squeeze-foam container comprises a container body having a top part opening and a body part which houses the above-mentioned liquid composition and has revert-elasticity, and a lid member which is attached to the top part opening, where the lid member comprises a liquid supply tube which extends into the container body to near the base part and supplies the liquid composition to the above-mentioned lid member when the body part is squeezed; a mixing chamber for mixing with air the above-mentioned liquid composition supplied from the liquid supply tube; a mesh member which produces a foam when the air-liquid mixture obtained in the mixing chamber is passed through it and thereby foamed; and the above-mentioned delivery outlet for delivering the foam produced by the mesh member,

and the mesh size of the above-mentioned mesh member is from 100 μm to 600 μm.

[Claim 2] The bleaching detergent product according to Claim 1, characterised in that the internal diameter of the above-mentioned liquid supply tube is from 1.0 mm to 3.0 mm.

[Claim 3] The bleaching detergent product according to Claim 1, characterised in that the above-mentioned lid member comprises an air supply hole which supplies air from inside the container body to the above-mentioned mixing chamber when the body part is squeezed, and a foam

supply pipe which supplies the foam produced by the mesh member to the above-mentioned delivery outlet.

[Claim 4] The bleaching detergent product according to Claim 1, characterised in that the above-mentioned bleaching agent is any one or more chosen from the group consisting of hydrogen peroxide, sodium hypochlorite, dichloroisocyanuric acid and trichloroisocyanuric acid.

[Claim 5] The bleaching detergent product according to Claim 1, characterised in that the viscosity of the above-mentioned liquid composition is adjusted to no greater than 100 P.

[Detailed description of the invention]

[0001]

[Technical field of the invention] The present invention relates to a bleaching detergent product contained in a squeeze-foam container which can deliver foam suitable for bleaching and cleaning when the body part of the container is squeezed by hand.

[0002]

[Prior art] Liquid bleaching detergents obtained by mixing a bleaching agent such as sodium hypochlorite and a nonionic surfactant such as a polyoxyethylene alkyl ether are used for removing dirt from and bleaching or disinfecting clothing, food products, household furniture, lavatory bowls and the like. When sold for household use, the liquid bleaching detergent is often packed in what is generally referred to as a "squeezable container". The squeezable container comprises a body part made of synthetic resin having revert-elasticity, and a pouring outlet which is formed in the top part and can be opened and closed, such that when the pouring outlet is open and the body part is squeezed by hand, an appropriate amount of the liquid bleaching detergent contained therein pours out from the pouring outlet. When

this squeezable container is not in use, the pouring outlet is closed to prevent leakage of the liquid bleaching detergent due to overturning, shaking or the like.

[0003]

[Problem to be solved by the invention] However, because the bleaching component is poured out from the pouring outlet as a liquid, liquid bleaching detergent contained in a common squeezable container is disadvantageous because the liquid bleaching detergent quickly permeates substrates such as cloth and is difficult to apply uniformly to a wide area, and uneven bleaching occurs readily. Also, when the aim is to partially bleach and clean part of the substrate, and the liquid agent is supplied to that part, an obvious boundary appears between the bleached part to which the liquid agent has adhered and the non-bleached part, and this can be unsightly. Furthermore, because liquid can drip from the pouring outlet, bleaching agent can adhere where it is not wanted, resulting in the decolouration of dyed material, and so forth.

[0004] Methods whereby the liquid bleaching detergent is foamed have been investigated in order to solve this problem. Foam permeates slower than liquid when a suitable amount of foamed bleaching detergent is applied to a substrate, and so it can be applied widely, and by varying the thickness of the foam applied, the amount of bleaching agent used can be increased or decreased in parts, and so bleaching and cleaning can be performed effectively, over wide areas or in parts, with no uneven bleaching. Also, the liquid is unlikely to drip and so the problem of unwanted bleaching is alleviated.

[0005] The following method has been considered as one method for delivering bleaching detergent from the

container as a foam: a liquid composition containing bleaching agent is loaded into a so-called "squeeze-foam container" such that when the body part of the container is squeezed, some of the liquid composition is mixed with air in the container, and the resulting mixture is passed through a mesh member to form a foam, and delivered from the delivery outlet as a foam. However, such systems are disadvantageous in that unless the conditions under which the foam is produced are selected, essentially no foam is obtained, or fine, uniform foam is not obtained, or, even if fine, uniform foam is obtained, the resulting foam does not collapse in a short time, and so the bleach component does not sufficiently permeate the fabric of the substrate.

[0006] The present invention was devised to solve the problem described above, and so the aim of the present invention is the provision of a bleaching detergent product which comprises a liquid composition loaded into a squeeze-foam container, such that squeezing the body part results in the delivery of a suitable amount of fine, uniform foam that collapses in a short time.

[0007]

[Means of solving the problem] As a means of solving the above-mentioned problem, the present invention provides a bleaching detergent product, where a liquid composition containing at least from 0.5% by weight to 10% by weight of bleaching agent and from 1% by weight to 50% by weight of anionic and/or nonionic surfactant is loaded into a squeeze-foam container that can deliver the liquid composition from a delivery outlet as a foam, where this squeeze-foam container comprises a container body having a top part opening and a body part which houses the above-mentioned liquid composition and has revert-elasticity, and a lid member which is attached to the top

part opening, where the lid member comprises a liquid supply tube which extends into the container body to near the base part and supplies the liquid composition to the above-mentioned lid member when the body part is squeezed; a mixing chamber for mixing with air the above-mentioned liquid composition supplied from the liquid supply tube; a mesh member which produces a foam when the air-liquid mixture obtained in the mixing chamber is passed through it and thereby foamed; and the above-mentioned delivery outlet for delivering the foam produced by the mesh member, and the mesh size of the mesh member is from 100 μm to 600 μm. The internal diameter of the above-mentioned liquid supply tube is preferably from 1.0 mm to 3.0 mm.

[0008] The above-mentioned lid member preferably comprises an air supply hole which supplies air from inside the container body to the above-mentioned mixing chamber when the body part is squeezed, and a foam supply pipe which supplies the foam produced by the mesh member to the above-mentioned delivery outlet.

[0009] The above-mentioned bleaching agent is preferably any one or more chosen from the group consisting of hydrogen peroxide, sodium hypochlorite, dichloro-isocyanuric acid and trichloroisocyanuric acid.

[0010] At least some of the above-mentioned surfactant is anionic surfactant, and the anionic surfactant is preferably any one or more chosen from the group consisting of α-olefin sulfonates (AOS), sodium (linear)alkylbenzene sulfonates, polyoxyethylene alkyl ether sulfates and C_8-C_{18} fatty acid methyl ester sulfonates.

[0011] At least some of the above-mentioned surfactant is nonionic surfactant, and the nonionic surfactant is preferably any one or more chosen from the group

consisting of polyoxyethylene alkyl ethers and polyoxyethylene nonylphenyl ether.

[0012] The viscosity of the above-mentioned liquid composition is preferably adjusted to no greater than 100 P.

[0013] In addition to the components described above, the above-mentioned liquid composition can also contain additives, such as bleaching agent stabiliser, pH regulator, chelating agent, builder, polyalkylene (C_2-C_6) glycol alkyl (C_1-C_5) ether, lower (C_1-C_4) alcohol, alkylene glycol derivative, enzyme agent, fluorescent agent and pigment.

[0014]

[Mode of the invention] A mode of the present invention is described below using examples and figures.

Example 1

Figure 1 shows an example of the inventive bleaching detergent product (hereafter, "product"). In Figure 1, the product 1 comprises squeeze-foam container (hereafter, "container") 2 with liquid composition (hereafter, "composition") A loaded therein.

[0015] Container 2 comprises container body 10, which houses composition A, is made of polypropylene having revert-elasticity, and comprises approximately elliptical base part 11, approximately elliptic cylindrical body part 12 and top part cylindrical opening part 13; and lid member 20 which is attached in an airtight fashion to opening part 13.

[0016] This lid member 20 comprises liquid supply tube 21 which extends into container body 10 to near base part 11 and supplies liquid composition A into the lid member when body part 12 is squeezed; mixing chamber 32 for mixing composition A supplied from liquid supply tube 21 with air B supplied from container body 10; mesh member

33 which produces foam C when the air-liquid mixture obtained on mixing in mixing chamber 32 is passed through it and thereby foamed; and delivery outlet 22 for delivering foam C produced by mesh member 33. The internal diameter of above-mentioned liquid supply tube 21 is 2.5 mm.

[0017] As shown in Figure 2, above-mentioned mesh member 33 comprises warp fibres 33a and woof fibres 33b made of nylon or the like, and is a mesh-like construction formed with gaps D, where the diameter L of warp fibres 33a and woof fibres 33b is 70 μm and the mesh size D is 210 μm.

[0018] Above-mentioned lid member 20 also comprises air supply hole 31 which supplies air B from inside container body 10 to above-mentioned mixing chamber 32 when body part 12 is squeezed, and foam supply pipe 34 which supplies foam C produced by mesh member 33 to above-mentioned delivery outlet 22.

[0019] In product 1, composition A contains 3% by weight of hydrogen peroxide as bleaching agent, and 10% by weight of surfactant. The surfactant comprises 1% by weight of α-olefin sulfonate (AOS) and 1% by weight of sodium polyoxyethylene lauryl ether sulfate as anionic surfactants, and 5% by weight of polyoxyethylene (10) alkyl (C_{12}-C_{13}) ether as nonionic surfactant. The viscosity of composition A is 1 P.

[0020] The method for using product 1 and the effects thereof are described below. A substrate is bleached and cleaned using product 1 as follows: body part 12 is squeezed by hand with container 2 upright, whereupon the internal pressure causes some of composition A in container body 10 to pass along liquid supply tube 21 in proportion to the extent of the squeezing, and thus the liquid is supplied from tube upper end 23 into mixing chamber 32.

[0021] Moreover, as a result of the increase in internal pressure caused by the squeezing of body part 12, some of air B stored above the surface of the liquid in container body 10 passes through air supply hole 31 and is supplied into mixing chamber 32, and in mixing chamber 32 it mixes with above-mentioned composition A to form an air-liquid mixture. With continued squeezing, the resulting air-liquid mixture is expelled from mixing chamber 32 and passes through mesh member 33; as it passes through the mesh of mesh member 33, the air bubbles in the air-liquid mixture are subdivided such that foam C is formed; foam C then passes along foam supply pipe 34 and is delivered from delivery outlet 22.

[0022] Here, as mesh member 33 has the above-mentioned mesh size (from 100 μm to 600 μm), uniform, fine, creamy foam C is produced when body part 12 is squeezed by hand. Also, because the internal diameter of the liquid supply tube is within the preferred range (from 1.0 mm to 3.0 mm), the proportion in which composition A and air B are supplied to mixing chamber 32 can be appropriately controlled, and the foam obtained under the combination of conditions relating to composition and container described in the example above is such that when the foam is applied to a substrate, it remains on the substrate for an amount of time that is appropriate in practice (up to 1 minute, for example), and then quickly collapses.

[0023] When container 2 is inverted and foam C delivered from delivery outlet 22 is applied onto a substrate, foam C adheres to the surface of the substrate, collapsed foam and composition A that has become liquid permeate into the fabric of the substrate by means of the osmotic effect of the surfactant contained in the composition, and the bleaching effect and washing effect are realised.

[0024] Composition A contains appropriate proportions of hydrogen peroxide as bleaching agent, and anionic surfactant and nonionic surfactant, and so a good balance is achieved between the bleaching action and the detergent action on the substrate, and dirt that has firmly adhered to or stained the substrate can be removed effectively.

[0025] Here, the foam remains on the substrate for a short time, and in this time, if foam C is supplied with uniform thickness, it is possible to achieve uniform bleaching and washing over a wide area of substrate. By locally regulating the thickness to which foam C is applied it is possible to locally regulate the amount of bleaching and detergent components used, and so it is even possible to achieve partial bleaching with no obvious boundary between the bleached part and the non-bleached part. Also, as the foam delivered from the delivery outlet is not fluid, there is no danger of unwanted bleaching due to drips from the delivery outlet.

[0026] When container 2 is inverted and foam C is applied to the substrate, air B in container body 10 migrates to base part 11 such that the lower end of liquid supply tube 21 is in the air layer, and so excess liquid composition A does not leak and drip from delivery outlet 22 via liquid supply tube 21.

[0027] Because body part 12 has revert-elasticity, when container 2 is set upright after application of a desired amount of foam, and the squeezing of body part 12 is stopped, body part 12 reverts to its pre-squeeze shape. At this time, there is negative pressure in container body 10, and so foam C that has remained in the vicinity of delivery outlet 22 is sucked back inside, and external air that has been introduced from delivery outlet 22 is also introduced into container body 10 by reverse flow

through air supply hole 31, to achieve equilibrium between the internal and external air pressures.

[0028] Container 2 can produce foam C when body part 12 is squeezed even when it is inverted. In such cases, the air and liquid layers in container body 10 are reversed such that composition A is supplied into mixing chamber 32 through air supply hole 31, and air B is supplied into mixing chamber 32 through liquid supply tube 21. Thereafter, composition A and air B mix in mixing chamber 32, and the air-liquid mixture passes through mesh member 33 such that foam C is produced, as when the system is upright.

[0029] The structure of container 2 is described in more detail below. Lid member 20 in the example described above is constructed by combining delivery member 24 and lid base 25. This delivery member 24 comprises approximately cylindrical wall part 26, and delivery pipe 27 which extends integrally from the upper part of wall part 26. Delivery pipe 27 comprises lower end opening 28 which opens downwards onto the shaft of cylindrical wall part 26, and a middle part which bends and slants upwards, opening at delivery outlet 22. A screw-spiral is formed on the inner surface of the lower part of wall part 26, and said screw-spiral screws tightly onto the screw-spiral formed on the outer surface of cylindrical upper cylinder part 41 which protrudes from lid base 25.

[0030] Lid base 25 is moulded as an approximate lidded cylinder comprising cylindrical wall part 42 and roof part 43 which is open in its centre part; a screw-spiral is formed on the inner surface of cylindrical wall part 42, and said screw-spiral screws tightly onto the screw-spiral formed on the outer surface of opening part 13 of the container body, thus lid base 25 is fixed. Above-mentioned upper cylinder part 41 protrudes upwards from

the circumference of the centre part opening of roof part 43, and inserted inside upper cylinder part 41 are above-mentioned mesh member 33, positioned so that it covers the centre part opening, and foam supply pipe 34 which supplies foam C, produced by mesh member 33, to delivery outlet 22.

[0031] Bung 37, which is moulded such that it fits into lower end opening 28 of delivery pipe 27, is attached to the upper end of foam supply pipe 34 via connecting pipe 36, which has side flow hole 35 to allow foam C to flow towards above-mentioned delivery pipe 27. When delivery member 24 is screwed in by turning to the right with respect to lid base 25, bung 37 fits into lower end opening 28 of delivery pipe 27 thereby closing it; when it is screwed out by turning to the left, end opening 28 of delivery pipe 27 is opened. Delivery member 24 and lid base 25 are provided with an interconnecting stopper (not shown) so that it is not possible to screw out beyond the limit when turning to the left.

[0032] Cylindrical skirt 44 extends perpendicularly downwards from the circumference of the centre part opening of roof part 43 of the lid base. Inserted and fixed inside skirt 44 is foaming member 45, which comprises above-mentioned mixing chamber 32, air supply hole 31 and a tube-receiving hole where liquid supply tube 21 is fixed into lid member 20.

[0033] The product constructed as described above is such that if delivery member 24 is screwed into lid base 25 during storage, lower end opening 28 of delivery pipe 27 is closed by bung 37 and so the composition A inside does not leak out even when the container is overturned.

[0034] When in use, delivery member 24 is screwed out, thereby opening delivery pipe 27, and if body part 12 of the container body is squeezed, delivery pipe 27 opens

and so composition A in container body 10 passes along liquid supply tube 21 to reach mixing chamber 32, where it mixes with the air supplied from air supply hole 31; the mixture then passes through mesh member 33 and is thereby foamed, and resulting foam C passes from foam supply pipe 34 through side flow hole 35 in connecting pipe 36, is introduced from inside the cylinder of delivery member 24 into lower end opening 28 of the delivery pipe, passes along delivery pipe 27 and is delivered from delivery outlet 22.

[0035] After a desired amount of foam has been delivered, the squeezing of body part 12 is stopped, and if delivery member 24 is screwed into lid base 25, delivery pipe 27 is closed and the composition A inside cannot leak out even if the container is overturned.

[0036] In container 2, at least body part 12 of the container body is preferably formed using polypropylene, polyethylene, polycarbonate or the like. Such synthetic resins have both good revert-elasticity and high oxygen permeability, and so if oxygen gas is generated by partial degradation of the bleaching agent in the composition on long-term storage, this oxygen gas will pass through the wall of the container body and disperse, and so swelling of the container can be prevented.

[0037] On considering the above-mentioned revert-elasticity and oxygen permeability, and the various physical properties required for containers of liquids, the thickness of the body part of the container body is preferably from 0.1 mm to 2.5 mm, particularly preferably from 0.7 mm to 1.5 mm.

[0038] In container 2, the mesh size D of mesh member 33 is an important condition for producing uniform, fine, creamy foam C. Experiment results indicate that a good foam C is obtained with a mesh size D of from 100 μm to

600 μ(sic). If the mesh size is less than 100 μm, there is increased resistance to the passage of the air-liquid mixture, excessive squeezing pressure is required to produce foam C; if composition A is very viscous, foam C cannot be obtained, and in some cases the mesh member may break due to the resistance to passage. If the mesh size exceeds 600 μ(sic), the air bubbles in foam C are coarse and the target uniform application of the composition onto the substrate is not achieved. The mesh size D of mesh member 33 is therefore preferably from 150 μm to 400 μm.

[0039] The internal diameter of liquid supply tube 21 is preferably from 1.0 mm to 3.0 mm. If this internal diameter is less than 1.0 mm, there is increased resistance to passage during squeezing, particularly when composition A is very viscous, and so the balance between composition A and air B supplied to mixing chamber 32 is disturbed and good foam is not obtained. If it exceeds 3.0 mm, the amount of composition A supplied to mixing chamber 32 is increased compared to the amount of air B supplied thereto, and good foam is not obtained. The internal diameter of liquid supply tube 21 is therefore more preferably from 1.5 mm to 2.5 mm.

[0040] Container 2 is not limited to one air supply hole 31; for example, a plurality of air supply holes 31 may be provided around the outer surface of liquid supply tube 21. The total cross-sectional area of air supply hole(s) 31 is preferably from 0.2 mm^2 to 7.0 mm^2, more preferably from 1.0 mm^2 to 4.0 mm^2.

[0041] The construction of composition A is described in more detail below. Any bleaching agent that is commonly used for household use or the like can be used as the bleaching agent in composition A. Examples include hydrogen peroxide, sodium hypochlorite, dichloro-

isocyanuric acid, trichloroisocyanuric acid and the like. Hydrogen peroxide is particularly suitable as the bleaching agent used in the present invention because it does not contain chlorine, has little odour and has a high bleaching effect.

[0042] The above-mentioned bleaching agent is contained in the composition at from 0.5% by weight to 10% by weight. If there is less than 0.5% by weight of bleaching agent, there is insufficient bleaching effect when the composition is applied to the substrate as foam. If there is more than 10% by weight, disadvantages arise in that, for example, uneven bleaching occurs readily. The bleaching agent concentration is therefore more preferably from 1% by weight to 5% by weight.

[0043] Anionic surfactant and/or nonionic surfactant can be used in the composition. It is particularly preferable to incorporate nonionic surfactant into the composition because nonionic surfactant not only has high detergency with respect to common oily contamination and the like, but also bestows appropriate viscosity to the composition, allowing the formation of a fine, suitably firm foam when the composition is passed through the mesh member together with air. The nonionic surfactant is preferably chosen from polyoxyethylene alkyl ethers and polyoxyethylene nonylphenyl ether.

[0044] Anionic surfactants have particularly high detergency with respect to aqueous dirt and mud. An anionic surfactant can also be used as a component for controlling the speed with which the foam collapses on the substrate. Examples of anionic surfactants include α-olefin sulfonates (AOS), sodium (linear)alkylbenzene sulfonates, polyoxyethylene alkyl ether sulfates and C_8-C_{18} fatty acid methyl ester sulfonates. It is preferable to choose a surfactant for incorporation

having an HLB of at least 10, more preferably at least 12, in order to increase the detergency of the composition.

[0045] Composition A contains from 1% by weight to 50% by weight of surfactant. If there is less than 1% by weight of surfactant it is difficult to achieve fine foaming of the composition with air, and the permeation and detergency with respect to the substrate fabric are poor, which is undesirable. If there is more than 50% by weight, practical usefulness deteriorates in that the composition becomes excessively viscous, strong squeezing is required to pass it through the mesh member, and it is difficult to achieve foaming. The amount of surfactant is therefore more preferably from 4% by weight to 20% by weight.

[0046] In addition to the above-mentioned bleaching agent and surfactant, composition A may, if necessary, also contain additives, such as pH regulator, builder, chelating agent, polyalkylene (C_2-C_6) glycol alkyl (C_1-C_5) ether, lower (C_1-C_4) alcohol, alkylene glycol derivative, enzyme agent, fluorescent agent and pigment, provided that this does not adversely affect the performance of the present invention. It is particularly preferable to add a stabiliser such as 1-hydroxyethylidene-1,1-diphosphonic acid in order to improve the stability of the bleaching agent.

[0047] The viscosity of the composition at 25°C is preferably adjusted to no greater than 100 P. If the viscosity exceeds 100 P, it becomes difficult to pass it through the mesh member with ordinary squeezing, and a good foam is not obtained. The viscosity of the composition at 25°C is therefore more preferably no greater than 70 P.

[0048] It is preferable to adjust the pH of the composition to from 2 to 7. If the pH of the composition is kept at from 2 to 7, it is possible to inhibit the production of oxygen gas originating from the degradation of the bleaching agent in the composition, and thereby prevent swelling of the container during long-term storage. The pH can be adjusted to within the above-mentioned range by adding a pH regulator if necessary.

[0049] The construction of the container and composition described above is not limited to above-mentioned Example 1. For example, the product may have the Example 2 construction shown in Figure 3.

[0050] Example 2

In the description of the product of Example 2, the structural elements in common with Example 1 that were described using Figure 1 are assigned the same numbers, and the explanations thereof are omitted or simplified. In Figure 3, bleaching detergent 3 comprises container 4 and composition A contained therein.

[0051] Container 4 comprises container body 10 as in above-mentioned Example 1, and lid member 50 attached tightly to opening part 13 thereof. Lid member 50 is constructed by combining delivery member 51 and lid base 52. Delivery member 51 comprises approximately cylindrical wall part 53 and delivery pipe 54 which extends integrally from the upper part of wall part 53. Delivery pipe 54 comprises lower end opening 55 which opens downwards onto the shaft of wall part 53, and a middle part which bends and slants upwards, opening at delivery outlet 56. A screw-spiral is formed on the inner surface of the lower part of wall part 53, and said screw-spiral screws tightly onto the screw-spiral formed on the outer surface of cylindrical upper cylinder part 57 which protrudes from lid base 52.

[0052] Lid base 52 is moulded as an approximate lidded cylinder comprising cylindrical wall part 58 and roof part 59 which is open in its centre part; a screw-spiral is formed on the inner surface of cylindrical wall part 58, and said screw-spiral screws tightly onto the screw-spiral formed on the outer surface of opening part 13 of the container body, thus lid base 52 is fixed.

[0053] Above-mentioned upper cylinder part 57 protrudes upwards from the circumference of the centre part opening of roof part 59. Inside this upper cylinder part 57 are mesh member 61, positioned so that it covers the centre part opening of roof part 59; foam supply pipe 62, which protrudes at the circumference; side flow hole 63, which is formed at the upper end part of foam supply pipe 62 and allows the flow of foam C to delivery pipe 54; and bung 64 which is moulded such that it fits into lower end opening 55 of delivery pipe 54 and is attached to the top part of foam supply pipe 62.

[0054] When delivery member 51 is screwed in by turning to the right with respect to lid base 52, bung 64 fits into lower end opening 55 of delivery pipe 54 thereby closing it; when it is screwed out by turning to the left, lower end opening 55 of delivery pipe 54 is opened. Delivery member 51 and lid base 52 are provided with an interconnecting stopper (not shown) so that it is not possible to screw out beyond the limit when turning to the left.

[0055] Also, air inlet hole 65 is formed in roof part 59 between above-mentioned upper cylinder part 57 and foam supply pipe 62 such that it pierces roof part 59, and in said air inlet hole 65 is provided ball-type check valve mechanism 66 which prevents backflow of air B from cylinder body 10; air in the cylinder of lid member 50 is supplied into container body 10 via this check valve

mechanism 66 and air inlet hole 65, and backflow is prevented.

[0056] Cylindrical skirt 67 extends perpendicularly downwards around the centre part opening of roof part 59 of the lid base, and inside from air inlet hole 65; liquid supply tube 21 is inserted inside skirt 67 with a gap between the upper end of liquid supply tube 21 and mesh member 61 to form mixing chamber 69. A plurality of grooves (68) are formed in the shaft direction on the inner wall of skirt 67, and these grooves (68) form air supply hole 68 which leads from inside container body 10 into mixing chamber 69.

[0057] Product 3 of Example 2 is such that if delivery member 51 is screwed into lid base 52 during storage, delivery pipe 54 is closed by bung 64 and so the composition A inside does not leak out even when the container is overturned.

[0058] When in use, delivery member 51 is screwed out, and if body 12 of the container is squeezed, delivery pipe 54 is opened and so composition A in the container body passes through liquid supply tube 21 to reach mixing chamber 69, where it mixes with air B supplied from air supply hole 68, and then passes through mesh member 61 and is thereby foamed; the resulting foam C passes from foam supply pipe 62 through side flow hole 63, is introduced into lower end opening 55 from inside the cylinder of delivery member 51, passes through delivery pipe 54 and is delivered from delivery outlet 56.

[0059] At this time, backflow of air B in the container body is prevented by check valve mechanism 66, and so there is no leakage via air inlet hole 65, and supplied liquid composition A and the air in mixing chamber 69 are utilised with no wasted squeezing, such that fine foam is

produced and an adequate amount can be delivered even with weak squeezing.

[0060] When, after delivery of a desired amount of foam, the squeezing of body part 12 is stopped, body part 12 reverts to its pre-squeeze shape. At this time, foam C that has remained in delivery pipe 54 is sucked back inside, and external air that has been introduced from delivery pipe 54 is introduced into container body 10 through air inlet hole 65 and check valve mechanism 66 until equilibrium is achieved between the internal and external air pressures. When the system is in this state, if delivery member 51 is screwed into lid base 52, delivery pipe 54 is closed such that the composition A inside does not leak out even if the container is overturned.

[0061] If the Example 2 construction is used, air supply hole 68 and air inlet hole 65 are provided independently and so the apertures can be provided as appropriate for the respective aims, such that a sufficient amount of good quality foam C can be produced during squeezing even if the squeezing is weak, and when the squeezing is stopped, external air is introduced into container body 10 with little air resistance and the depression in body part 12 can quickly revert to its original shape.

[0062] Test examples

Samples (Examples 3 to 6) were prepared using the product of Example 1 shown in Figure 1 and containers having the same shape as described in Example 1, with the mesh member mesh size (D in Figure 2) and the internal diameter of the liquid supply tube 21 (tube diameter) variously altered within the scope of the present invention; the condition of the foams delivered on squeezing was observed for these samples.

[0063] Comparative examples 1 to 3

Samples were prepared using containers having the same shape as described in Example 1 with mesh member mesh sizes (D in Figure 2) beyond the scope of the present invention (Comparative examples 1 and 2) and with no surfactant in the composition (Comparative example 3); the condition of the foams was observed for the samples in the same way.

[0064] The condition of the foams was appraised as follows for each of the above-mentioned samples. Each squeeze-foam container packed with composition was inverted over a wetted towel, the body part was squeezed by hand by a female panel member such that foam was delivered on to the wetted towel, and the condition of the foam was appraised using the four-point scale below.

●: Uniform, fine foam formed, and collapsed within 1 minute.

o: Somewhat non-uniform foam formed, and collapsed within 1 minute.

Δ: The foam was non-uniform and dirty, and collapsed within 3 minutes.

×: No foam was obtained, or it did not collapse within 3 minutes.

The results are shown in Table 1.

[0065] In Table 1, the composition components are abbreviated as follows, and the numerical values for the compositions all represent % by weight.

AOS: α-olefin sulfonate

LES: sodium polyoxyethylene lauryl ether sulfate

POE: polyoxyethylene (10) alkyl (C_{12}-C_{13}) ether

HEDP: sodium 1-hydroxyethylidene-1,1-diphosphonate

DEGB: diethylene glycol monobutyl ether

[0066]

[Table 1]

		Example					Comparative example		
		1	3	4	5	6	1	2	3
Composition % by weight	Hydrogen peroxide	3	3	5	5	5	3	5	5
	AOS	1	1	-	-	-	1	-	-
	LES	1	1	1	1	1	1	1	-
	POE	5	5	15	1	1	5	15	-
	HEDP	5	5	2	2	5	5	2	5
	DEGB	5	5	5	5	5	5	5	5
	Perfume	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Purified water	R	R	R	R	R	R	R	R
Conditions	Mesh size μm	210	160	400	250	300	70	650	210
	Tube diameter mm	2.5	1.5	1.8	3.5	1.0	2.5	1.8	2.5
Appraisal	Condition of the foam	●	●	●	○	○	×	Δ	×

R: Remainder

[0067] The results in Table 1 show that the Example 1, Example 3 and Example 4 samples, where the liquid composition contained bleaching agent and a preferred amount (from 4% by weight to 20% by weight) of surfactant, the mesh size of the mesh member of the container was from 100 μm to 600 μm and the inner diameter of the liquid supply tube was within the preferred range (from 1.0 mm to 3.0 mm), all formed uniform, fine foam which collapsed within 1 minute (●) and were deemed suitable for use in practice.

[0068] In the Example 5 sample, the internal diameter of the liquid supply tube exceeded the preferred range (3.5 mm) and so a small amount of somewhat non-uniform foam was formed. In the Example 6 sample, the surfactant content (2% by weight) was within the inventive range but below the preferred range, and so the foam was coarse and appeared somewhat non-uniform. However, the foams of Examples 5 and 6 did collapse within 1 minute, and were therefore deemed usable in practice (○).

[0069] Conversely, in the Comparative example 1 sample, the composition and liquid supply tube internal diameter were the same as in Example 1, but the mesh size (70 μm) was less than 100 μm, and so the foam was too firm and did not collapse within 3 minutes (×). In the Comparative example 2 sample, the composition and liquid supply tube internal diameter were the same as in Example 4, but the mesh size (650 μm) exceeded 600 μm, and so the foam was non-uniform, had a poor external appearance and took a long time to collapse (from 1 to 3 minutes) (Δ). In the Comparative example 3 sample, the composition did not contain surfactant and so despite the fact that the container mesh size (210 μm) and the liquid supply tube internal diameter (2.5 mm) were within the preferred ranges for the present invention, no foaming occurred and foam was not obtained from the delivery outlet (×).

[0070]

[Advantages of the invention] The inventive bleaching detergent product comprises a liquid composition containing from 0.5% by weight to 10% by weight of bleaching agent and from 1% by weight to 50% by weight of anionic and/or nonionic surfactant loaded into a squeeze-foam container, where this container houses a mesh member for foaming which has a mesh size of from 100 μm to 600 μm; consequently, by squeezing the body part of the container by hand it is possible to deliver a fine foam which collapses in a short time and is suitable for bleaching and washing.

[0071] If the internal diameter of the liquid supply tube of the squeeze-foam container is from 1.0 mm to 3.0 mm, the balance of the mixture of liquid composition and air that forms the foam is good, and it is possible to deliver an even finer, uniform foam which collapses in a

short time and is very suitable for bleaching and washing.

[Brief description of the figures]

[Figure 1] Figure 1 is a cross-section diagram of an example of the present invention.

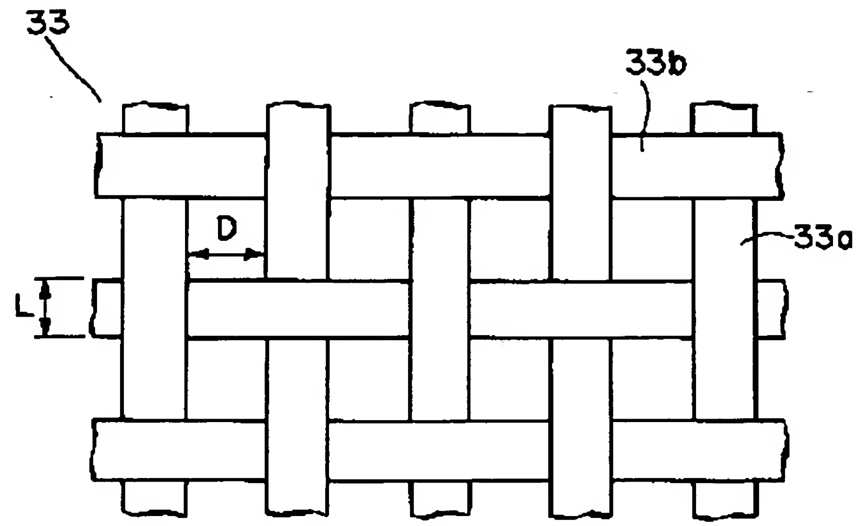
[Figure 2] Figure 2 is a plane view of an example of a mesh member in the above-mentioned example.

[Figure 3] Figure 3 is a cross-section diagram of another example of the present invention.

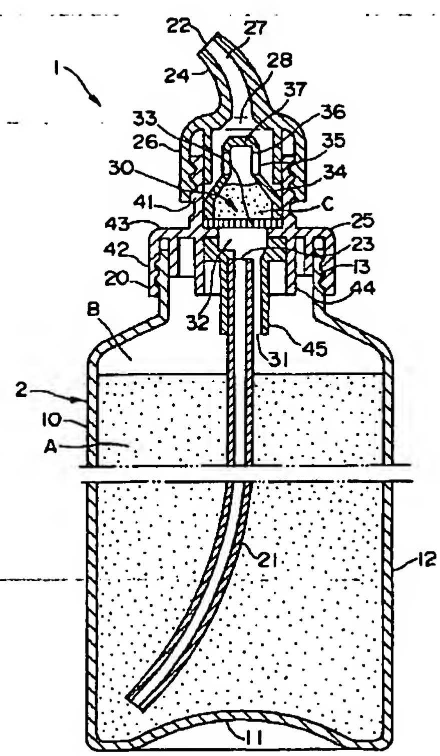
[Figure legend]

1 Bleaching detergent product (product)
2 Squeeze-foam container (container)
A Liquid composition (composition)
B Air in the container
C Foam
10 Container body
12 Body part
20 Lid member
21 Liquid supply tube
22 Delivery outlet
30 Foaming means
31 Air supply hole
32 Mixing chamber
33 Mesh member
D Mesh size

[Figure 2]



[Figure 1]



[Figure 3]